composition while the substrate support is rotating to form an etched metal conductive layer.

2. The method of claim 1, further comprising exposing the etched metal conductive layer to an etchant gas for a period of time sufficient to remove substantially all of the metal conductive layer from the field of the substrate, and to planarize the top surface of the metal conductive layer.

3. The method of claim 1 wherein the metal conductive layer comprises copper.

4. The method of claim 1 wherein the liquid etching composition is sprayed onto the substrate in the direction of rotation of the substrate.

5. The method of claim 1 wherein the liquid etching composition comprises one or more etchants, wherein the one or more etchants are selected from the group consisting of nitric acid, hydrochloric acid, peroxygen compounds, and combinations thereof.

6. The method of claim 1 wherein the liquid etching composition is delivered to the substrate by one or more top nozzles.

7. The method of claim 1 further comprising contacting the metal conductive layer with a rinse composition after the liquid etching composition.

8. The method of claim 2 further comprising igniting the etchant gas into a plasma.

9. The method of claim 2 wherein the etchant gas comprises a chlorine-containing material.

10. A method of processing a metal conductive layer on a substrate, comprising:

(a) placing a substrate on a substrate support wherein the substrate has a metal conductive layer disposed on a top surface of the substrate, and wherein the substrate has stray metal conductive material on one or more other surfaces of the substrate;

(b) rotating the substrate support;

(c) while the substrate support is rotating, contacting the top surface of the substrate with a first liquid etching composition in order to remove portions of the top surface of the metal conductive layer;

(d) contacting the one or more other surfaces of the substrate with a second liquid etching composition in order to remove stray metal conductive material thereon; and

(e) exposing the metal conductive layer to an etchant gas after the contacting step (c) in order to planarize the top surface of the metal conductive layer.

11. The method of claim 10 wherein step (e) is performed after the contacting step (d).

12. The method of claim 10 wherein the metal conductive layer comprises copper.

13. The method of claim 10 wherein the substrate is rotated in a direction of rotation and the liquid etching composition is delivered in a direction of delivery, and wherein the direction of rotation and the direction of delivery are the same.

14. The method of claim 10 wherein the first liquid etching composition and the second liquid etching composition comprise one or more of the same or different etchants, selected from the group consisting of nitric acid, hydrochloric acid, peroxygen compounds, and combinations thereof.

15. The method of claim 10 wherein the liquid etching composition is delivered to the top surface of the substrate by one or more top nozzles and the some or a different

liquid etching composition is delivered to the one or more other surfaces of the substrate by one or more additional nozzles.

16. The method of claim 10 further comprising contacting the metal conductive layer with a rinse composition.

17. The method of claim 10 further comprising igniting the etchant gas of step (d) into a plasma.

18. The method of claim 11 wherein the etchant gas comprises a chlorine-containing material.

19. A method of forming a metal conductive feature on a substrate, comprising:

(a) placing a substrate on a substrate support, the substrate having a top surface with a material layer on said top surface, and the material layer having at least one opening therethrough;

(b) depositing a metal conductive layer having a pre-etch field thickness, wherein the metal conductive layer completely fills the at least one opening;

(c) rotating the substrate; and

(d) while the substrate is rotating, contacting the top surface of the substrate with a liquid etching composition in order to remove portions of a top surface of the metal conductive layer.

20. The method of claim 19, including exposing the metal conductive layer to an etchant gas for a period of time sufficient to remove substantially all of the conductive layer from the field of the substrate, and planarize the top surface of the metal conductive layer.

21. The method of claim 19 wherein the metal conductive layer comprises copper.

22. The method of claim 19 wherein the top surface of the metal conductive has an initial surface roughness greater than about 70 Angstroms.

23. The method of claim 19 wherein the depositing step (b) is an electrochemical plating process.

24. The method of claim 19 wherein the substrate is rotated in a direction of rotation and the liquid etching composition is delivered in a direction of delivery, and wherein the direction of rotation and the direction of delivery are the same.

25. The method of claim 19 wherein the liquid etching composition comprises one or more etchants, wherein the one or more etchants are selected from the group consisting of nitric acid, hydrochloric acid, peroxygen compounds, and combinations thereof.

26. The method of claim 19 wherein the liquid etching composition is delivered to the substrate by one or more top nozzles.

27. The method of claim 19 further comprising contacting the metal conductive layer with a rinse composition.

28. The method of claim 19 wherein step (d) is performed for a period of time so that the metal conductive layer has a post wet etch field thickness less than about 500 Angstroms.

29. The method of claim 19 further comprising igniting the etchant gas of step (e) into a plasma.

30. The method of claim 19 wherein the etchant gas comprises a material selected from the group consisting of chlorine-containing materials, bromine-containing materials, fluorine-containing materials, and combinations thereof.

31. An apparatus for etching a metal conductive layer on a substrate, comprising:

(a) a container;

(b) a substrate support disposed in the container;

(c) a rotation actuator attached to the substrate support;

(d) a fluid delivery assembly disposed in the container to deliver liquid etching composition to a top surface of a substrate disposed on the substrate support.

32. The apparatus of claim 31 wherein the fluid delivery assembly comprises one or more top nozzles.

33. The apparatus of claim 31 wherein an opening in each of the one or more top nozzles is capable of being disposed above a plane defined by the substrate.

34. The apparatus of claim 31 wherein the fluid delivery system is selectively coupled between one or more etchant sources and one or more rinse fluid sources.

35. The apparatus of claim 32 comprising a first plurality of top nozzles connectable to one or more etchant sources and a second plurality of top nozzles connectable to one or more rinse fluid sources.

36. The apparatus of claim 35 further comprising one or more additional nozzles positioned to provide fluid to a surface of the substrate selected from the group consisting of a bottom surface, an edge surface, and combinations thereof.

37. In a system for processing semiconductor wafers in one or more processing cells mounted in a clean environment on a single platform, the improvement which comprises including an etch-back station on the same platform and in the same clean environment.

38. A method in which the planarizing method of claim 1 is carried out on the same platform and in the same environment in which the metal conductive layer was deposited on the substrate.

39. The method of claim 38 in which, after the etching step, the substrate is rinsed and then transferred to another processing cell for further processing on the same platform and in the same clean environment.

40. The method of claim 38 in which the liquid etching step is followed by a dry etching step.

41. An electrochemical plating platform enclosed in a clean environment for processing semiconductor wafers, comprising an electroplating cell, a liquid etching station and a transfer robot adapted to transfer wafers to the electroplating cell and from the electroplating cell to the liquid etching station.

42. A method of forming a copper feature on a substrate, comprising:

(a) placing a substrate on a substrate support, the substrate having a top surface with a material layer on said top surface, and the material layer having at least one opening therethrough;

(b) depositing a copper layer having a pre-etch field thickness, wherein the metal conductive layer completely fills the at least one opening;

(c) rotating the substrate; and

(d) while the substrate is rotating, contacting the top surface of the substrate with a liquid etching composition selected from the group consisting of nitric acid, hydrochloric acid, peroxygen compounds, and combinations thereof, and sprayed onto the substrate in the direction of rotation of the substrate, in order to remove portions of a top surface of the copper layer.

43. A method of forming a copper feature on a substrate, comprising:

(a) placing a substrate on a substrate support, the substrate having a top surface with a material layer on said top surface, and the material layer having at least one opening therethrough;

(b) depositing a copper layer having a pre-etch field thickness, wherein the metal conductive layer completely fills the at least one opening;

(c) rotating the substrate; and

(d) while the substrate is rotating, contacting the top surface of the substrate with a liquid etching composition is selected from the group consisting of nitric acid, hydrochloric acid, peroxygen compounds, and combinations thereof, and is sprayed onto the substrate in the direction of rotation of the substrate in order to remove portions of a top surface of the metal conductive layer, and

(e) exposing the etched metal conductive layer to an etchant gas for a period of time sufficient to remove substantially all of the conductive layer from the field of the substrate, and to planarize the top surface of the metal conductive layer.

44. A method of processing a metal conductive layer on a substrate, comprising:

(a) placing a substrate on a substrate support supporting a substrate in an electroplating cell on an electroplating platform;

(b) depositing a copper layer on a top surface of the substrate, wherein the substrate has stray copper on one or more other surfaces of the substrate;

(c) moving the substrate to an etch-back module on the electroplating platform;

(d) rotating the substrate support;

(e) while the substrate support is rotating, spraying the top surface of the substrate with a first liquid etching composition in order to remove portions of the top surface of the copper layer; the spray being directed in the direction of rotation;

(f) contacting the one or more other surfaces of the substrate with a liquid etching composition in order to remove stray copper thereon; and

(g) exposing the metal conductive layer to an etchant gas after the contacting step (e) in order to planarize the top surface of the copper layer.

45. A method of forming a copper feature on a substrate, comprising:

(a) placing a substrate on a substrate support, the substrate having a top surface with a material layer on said top surface, and the material layer having at least one opening therethrough;

(b) depositing a copper layer having a pre-etch field thickness, wherein the metal conductive layer completely fills the at least one opening;

(c) rotating the substrate; and

(d) while the substrate is rotating, contacting the top surface of the substrate with a liquid etching composition selected from the group consisting of nitric acid, hydrochloric acid, peroxygen compounds, and combinations thereof, and sprayed onto the substrate in the direction of rotation of the substrate, in order to remove portions of a top surface of the copper layer; each of steps (a)-(d) being performed in the same electroplating platform and in the same environment.

46. A method of forming a copper feature on a substrate, comprising:

(a) placing a substrate on a substrate support, the substrate having a top surface with a material layer on said top surface, and the material layer having at least one opening therethrough;

(b) depositing a copper layer having a pre-etch field thickness, wherein the metal conductive layer completely fills the at least one opening;

(c) rotating the substrate; and

(d) while the substrate is rotating, contacting the top surface of the substrate with a liquid etching composition is selected from the group consisting of nitric acid, hydrochloric acid, peroxygen compounds, and combinations thereof, and is sprayed onto the substrate in the direction of rotation of the substrate in order to remove portions of a top surface of the metal conductive layer, and

(e) exposing the etched metal conductive layer to an etchant gas for a period of time sufficient to remove substantially all of the conductive layer from the field of the substrate, and to planarize the top surface of the metal conductive layer; each of steps